Additive Manufacturing

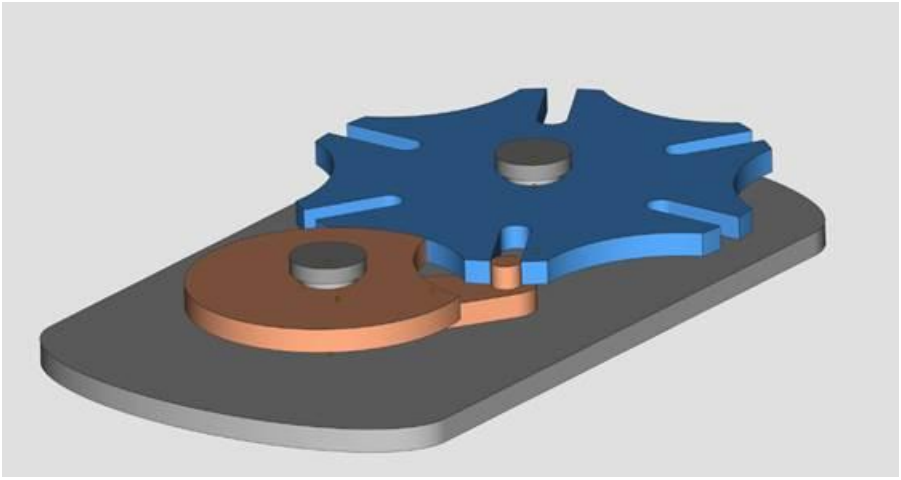
Date	March 13, 2026	**Orientation Time**	08:00 A.M
Location	C-TEC of Licking County 150 Price Road Newark, Ohio 43055	**Contest Time**	Immediately following orientation (CLOSED contest)
Scope of Contest	• The competition will consist of the following: • 3D design that demonstrates thoughtful design for additive manufacturing and solves a given problem under given constraints. • Engineering notebook documenting design process and challenges. • Presentation of design and notebook to the judges. The competition will focus on real-world challenges of an individual and team and build on each team's understanding of: • Physical, functional, and performance characteristics or specifications that uniquely identify a component or device and determine its interchangeability in a system • Material properties (material specifications will be provided) **Final designs will demonstrate an ability to:** • Design for integration into an existing process • Adapt to an existing design/interface **On contest day, students will:** • Provide Engineering Notebook (Engineering notebook guidelines below). • Present Design to judges and answer questions. • Showcase the functionality of the 3D-printed component. • Please reference Appendix A for project specifications. **Engineering Notebook Guideline (No more than 10 pages):** • The Engineering Notebook should contain robust content, including at a minimum the following: • Be clearly labeled with contestant name(s), date and page # on each page • Begin with a problem statement • Include discovery and documentation of approach to solve problems • Include sketched design concepts with critical features labeled • Critical dimensions clearly labeled in design sketch		

	• Considerations for designing for additive manufacturing distinctly addressed (i.e. part strength, part orientation) especially including any expected risks during printing • Screenshots of the print time and material usage for all printed parts • Design decisions and alternatives are documented and evaluated thoughtfully **Presentation Criteria (Presentation time of 10 minutes, Maximum):** • The team clearly describes their understanding of the problem to be solved. • Design Process: good design logic is used for key design choices was intentional and well-communicated • The presentation is professional and well-rehearsed • Practical evaluation • Teams may use a laptop to assist with the presentation, though not required.
Testing	No
Eligibility	1 team of 2 for every 50 paid members enrolled in program
Clothing	Clothing Classification Guide – CLASS A or F
Provided by Contestant	• Professional Resumé – Typed Hardcopy • Emergency Medical Form (Contestants must have this to compete) Each team is responsible for bringing their 3D printed model and Engineering Notebook to the competition. No parts will be printed at the competition. Models must adhere to the contest guidelines from the proposed standards: **NOTE:** You need administrative privileges on the laptop that you bring. Please clear this with your IT department before coming. Make sure you can access your software and save to your flash drive before arriving to the contest. **Optional Supplies:** • Computer for presentation of design <u>The following WILL NOT be tolerated and are grounds for disqualification from the competition</u>: o No smart watches, cellphones and/or other electronic devices in the contest area unless specifically stated in this document. These devices cannot be used as a calculator. o No contact with anyone outside of the contest area once the contest begins. o No inappropriate communication between contestants such as verbally degrading another contestant or informing another contestant of the skills/test prior to or during the competition. o No cheating on any portion of the contest. The use of AI is strictly prohibited and will result in an automatic disqualification of the contestant.

	Contest Skilled Performance Standards **AMF 1.0—**Design, sketch and plan machine work to U.S. National CAD Standards **AMF 2.0—**Preform and inspect part(s) using a Total Quality Management process **AMF 3.0**—Demonstrate safety practices in a working situation to the related duty tasks of theNational Institute for Metalworking Skills (NIMS) Duties and Standards **AMF 4.0**—Provide an accurate quotation given an automated manufacturing technology simulated scenario	**Aligned ODEW Career Field Technical Content Standard Outcomes:** **5.1 The Design Process** 5.1.1 Define the goal of a design 5.1.2 Describe the role of research, development and experimentation in design problem solving. 5.1.3 Conduct an investigation to identify customer needs, constraints and criteria. 5.1.4 Develop multiple solutions and select an approach. 5.1.5 Develop a design proposal and make a model/prototype. 5.1.6 Evaluate and redesign a prototype using collected data. 5.1.7 Use process planning and improvement tools to manage the life cycle of a product. 5.1.8 Identify the potential concept and design flaws (e.g., concept model corrections, audit documentation using Design Failure Mode Effect Analysis [DFMEA]). 5.1.10 Document progress and capture ideas during the development phase. **6.2 Additive Manufacturing:** 6.2.1 Describe the steps of the additive manufacturing (e.g., pre-processing processing and post-processing). 6.2.2 Identify the type of material, tooling, and additive method required to meet product Specifications

		6.2.3 Select appropriate machine, work holding device, speeds and end of arm tooling required to produce the part 6.2.4 Configure the additive manufacturing equipment. 6.2.5 Prepare work pieces for manufacturing 6.2.6 Manufacture the material utilizing the necessary method, tooling, and material to meet product specifications 6.2.7 Perform additive manufacturing for rapid prototyping and customization. **10.1 Site Safety:** 10.1.1 Knowledge of safety standards and regulations, including Hazard Communication (HAZCOM) and Occupational Safety and Health Administration (OSHA) requirements (e.g., Working at Heights, Confined Space)

Appendix A	**SkillsUSA 2026 Additive Manufacturing Regional Challenge** **Kinematic Assembly Models** Welcome to the "Kinematic Assembly Models" challenge! The task at hand is to design a functional/movable assembly, also known as a gear system, or kinematic model. Examples of this type of system are listed below. This should help get you started on an idea: ● Peristaltic Pump ● Geneva Gear ● Rack and Pinion ● Differential ● Planetary Gear ● Bearing



(Above) Example of a functional assembly is for reference only.

Competition Requirements

1. The design **must** contain at least 3 individual bodies to be printed assembled or to be assembled after printing.
2. Printed parts **must** be able to mate and stay together by design or additional hardware provided by the contestant.
3. The design **must** contain at least two printed moving parts in the assembly.
4. One printed part's motion **must** be directly driven by another printed part's motion.
5. The printed parts **must** be able to mate together as an assembly, as designed, without major post-processing.
6. The design **must** be able to rotate/move as designed and should not have excessive backlash.
7. The design **can** contain additional store-bought hardware for the final assembly; this should be provided by the contestant and brought to judging.
8. 3D Printed Design - Students **must** create a design that:
    - Is original and designed by a contestant
    - Prints all parts in less than 18 hours
    - Uses less than 60 cubic inches (1kg) of model and/or support combined for all parts

Tips for Competitors

Here are some tips to maximize the points awarded to you:

- Be sure to design using the correct tolerance between printed parts to allow motion of assembly.
- Be creative by incorporating an end-use for the design.
- Additional moving parts may add to your score but can produce more points of failure on the final assembly.

	● Try leveraging design for 3D technology to reduce the additional hardware needed for final assembly.
	● Use online resources (YouTube, GrabCAD Tutorials, Cornell's Kinematic Models for Design)
	● Whenever intellectual property (IP) deters you from a project, try using approximate geometries to communicate the design intent
	● Solve a problem that impacts multiple people
	● Optional design for additive manufacturing learning resources:
	  ● Stratasys Think Additively™ Masterclass:
	  ○ https://youtube.com/playlist?list=PLUYaY5EIPtNBdU-s-7l9rl05lBHHlTarI